LOFAR – Low frequency Array

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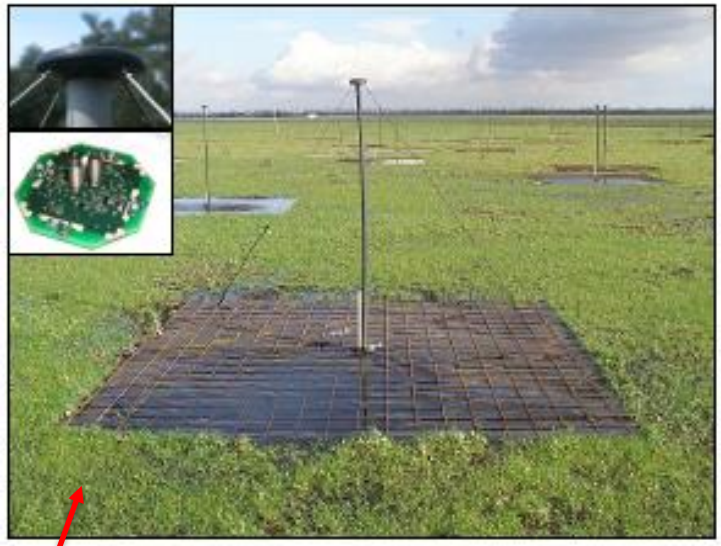
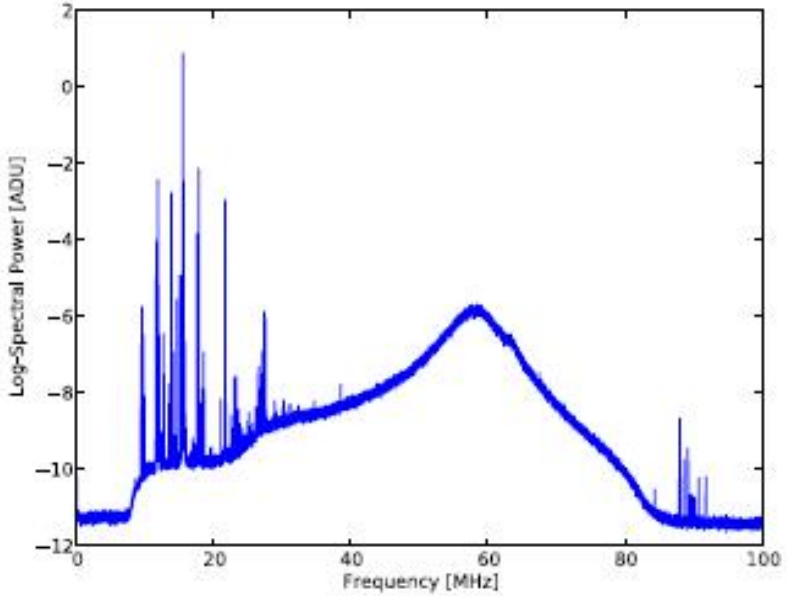
Low Frequency Array

Array elements





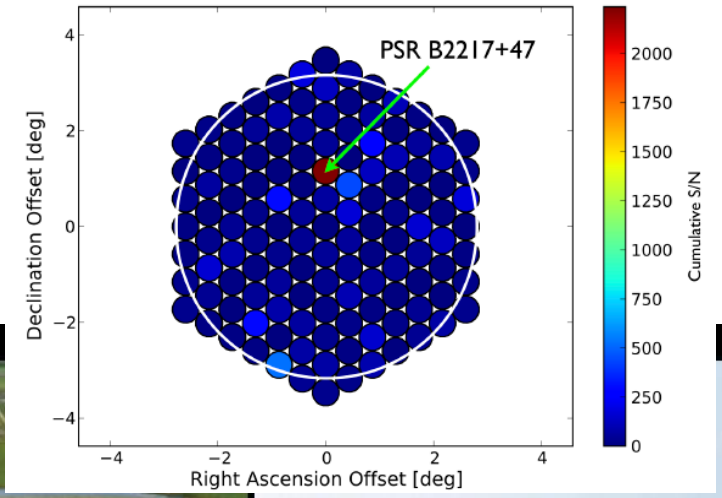
Overview

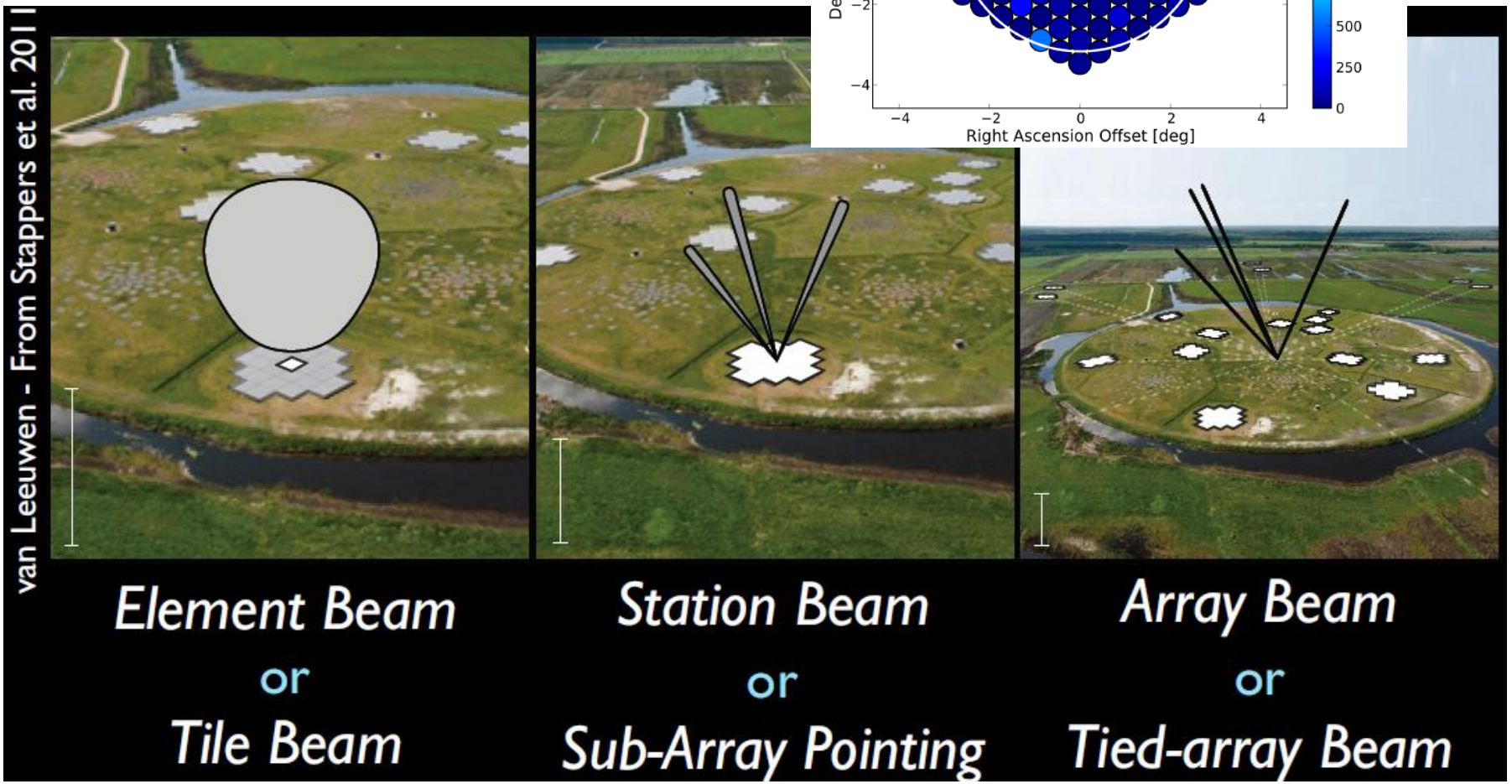
System characteristic	Options	Values	Comments
Frequency range	Low-band Antenna	10–90 MHz	
		30–90 MHz	With analog filter
	High-band Antenna	110–190 MHz	200 MHz sampling (2nd Nyquist zone)
		170–230 MHz	160 MHz sampling (3rd Nyquist zone)
		210–250 MHz	200 MHz sampling (3rd Nyquist zone)
Number of polarizations		2	
Bandwidth	Default	48 MHz	16-bit mode
	Maximum	96 MHz	8-bit mode
Number of simultaneous beams	Minimum	1	
	Maximum	244	16 bit mode, one per sub-band
	Maximum	488	8 bit mode, one per sub-band
Sample bit depth		12	
Sample rate	Mode 1	160 MHz	
	Mode 2	200 MHz	
Beamformer spectral resolution	Mode 1	156 kHz	
	Mode 2	195 kHz	
Channel width (raw correlator resolution)	Mode 1	610 Hz	
	Mode 2	763 Hz	

Van Haarlem et al, A&A, 20013

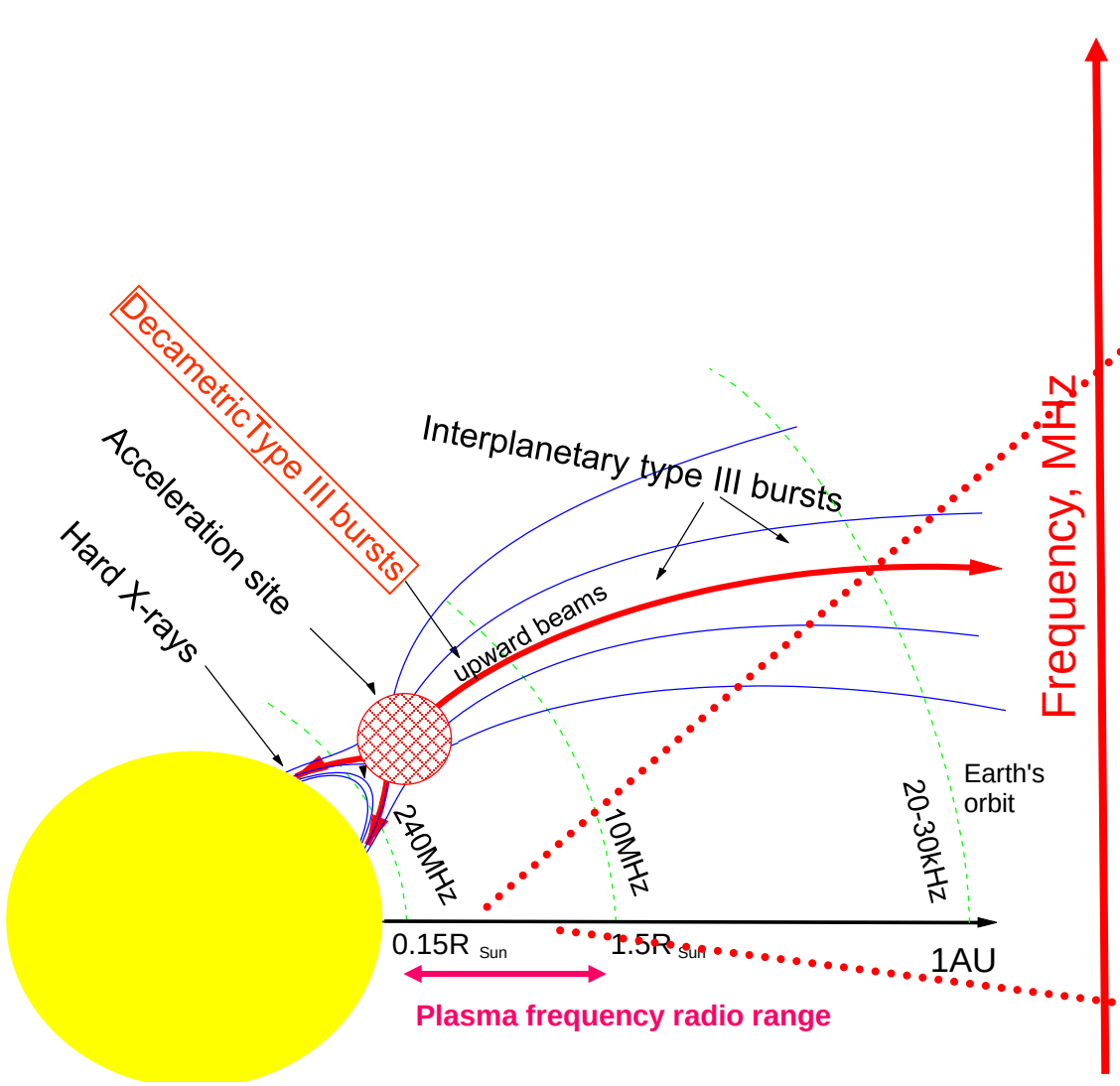
Overview

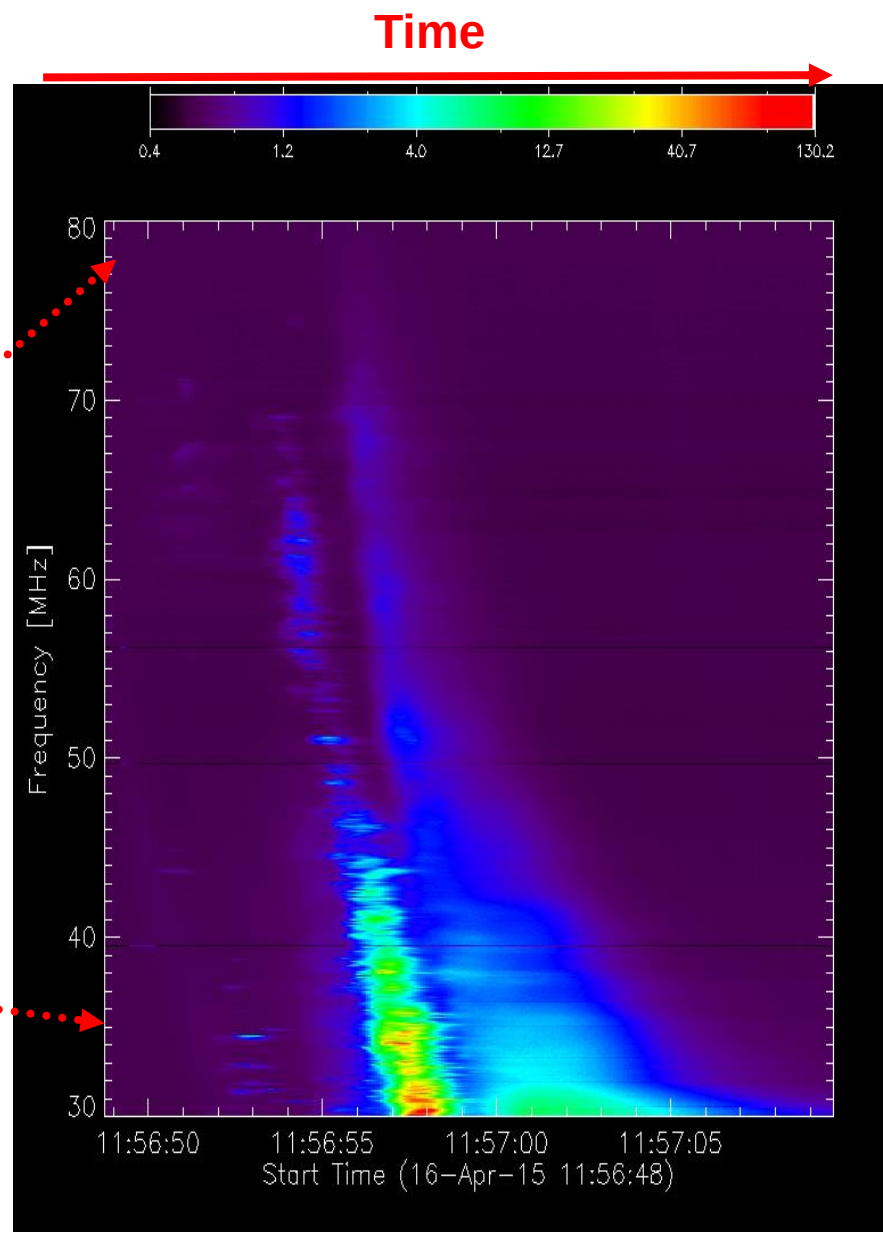
Van Haarlem et al, A&A, 20013





Flares and accelerated particles





$$\nu_p = \sqrt{\frac{n_e e^2}{\pi m_e}},$$ <= plasma frequency

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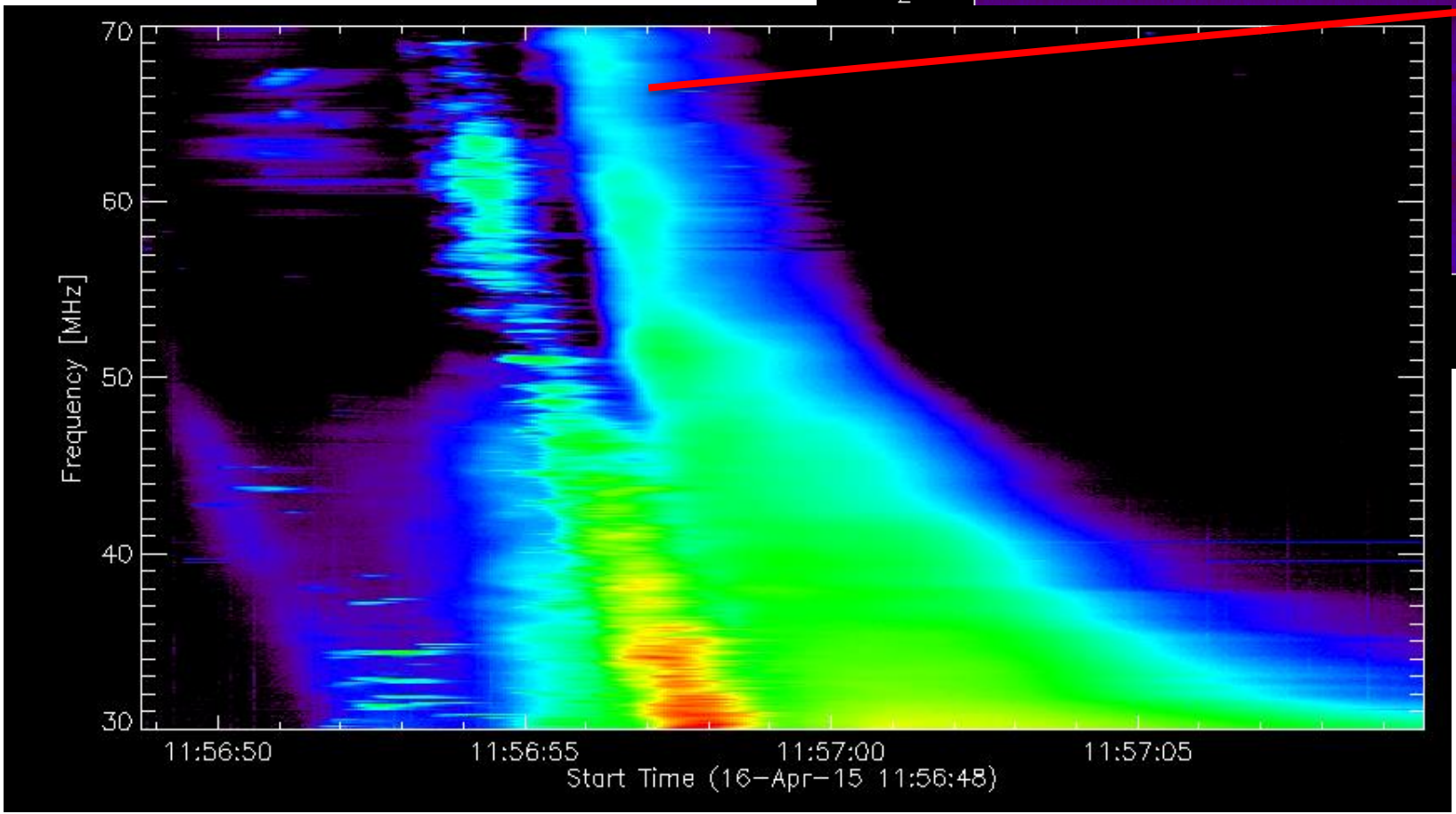
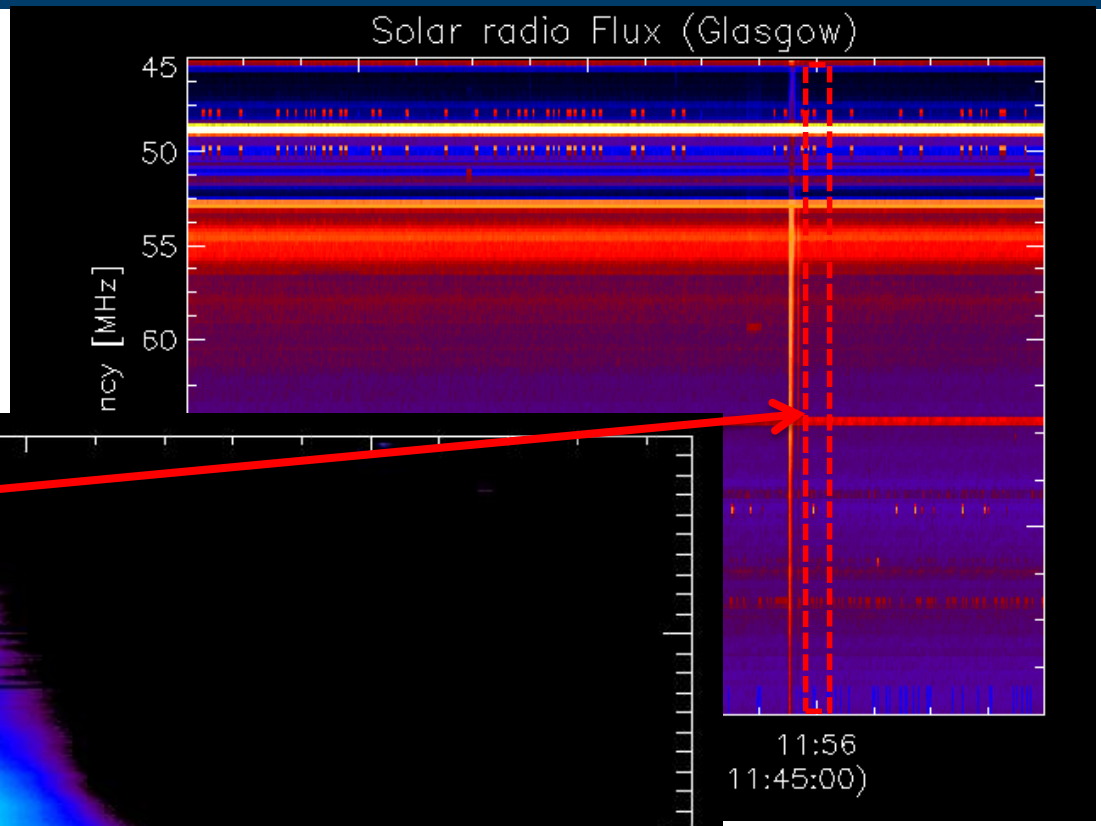
Type III bursts





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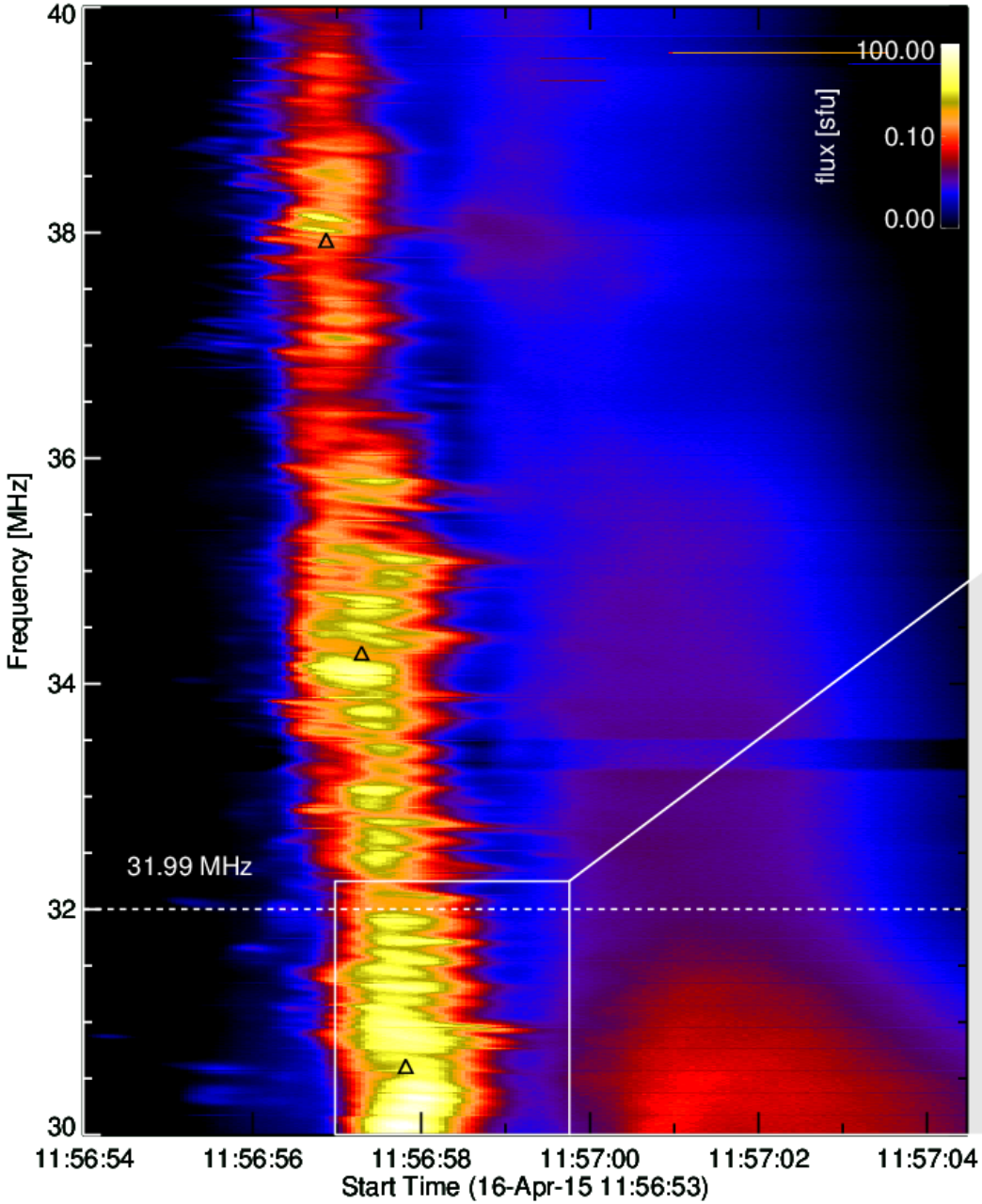
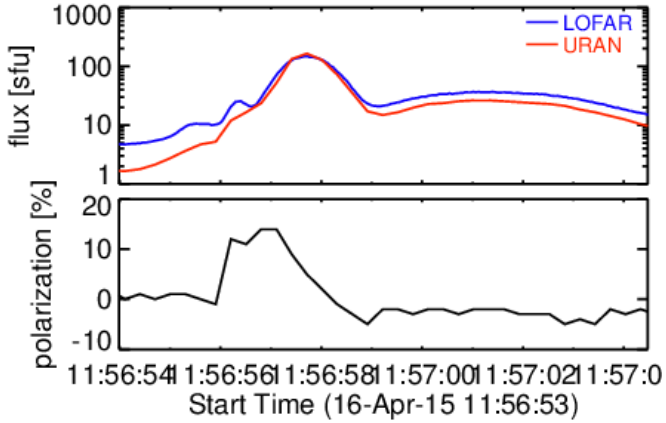
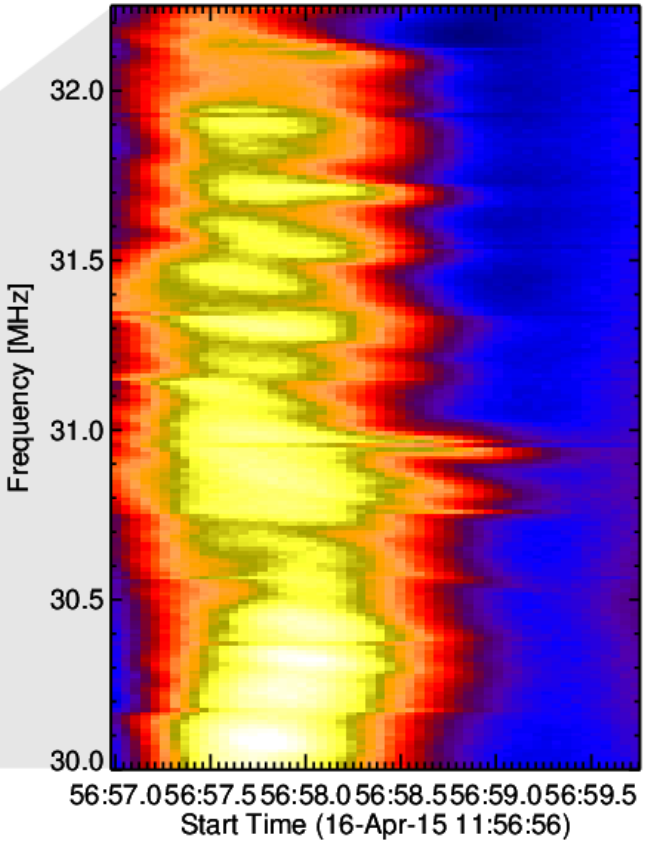
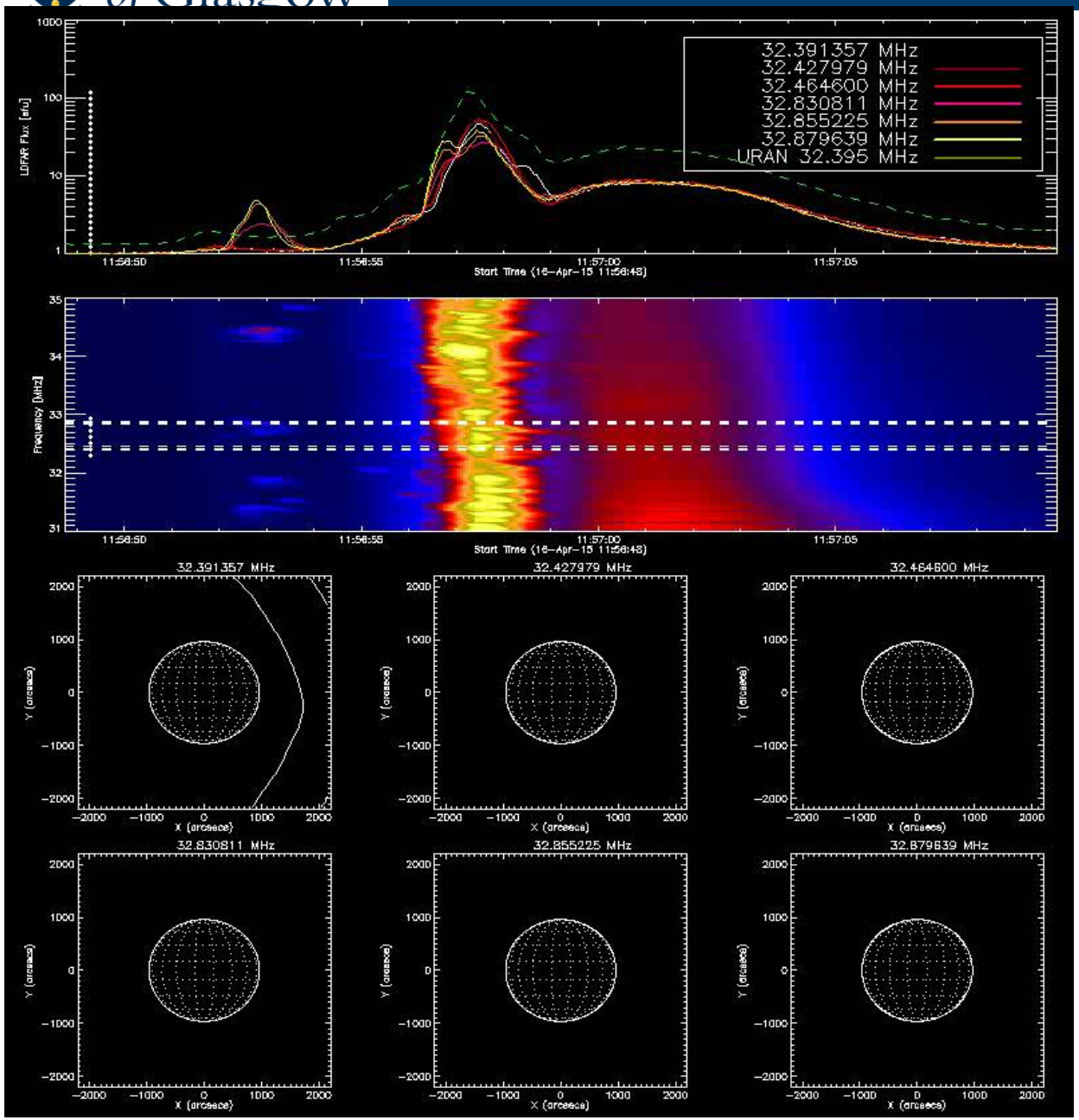
Fine structure and type III bursts







Type IIIb structure



12 kHz bands simultaneous imaging between 30 and 80 MHz

C. Vocks, G. Mann, and F. Breitling

LOFAR observations of the quiet solar corona

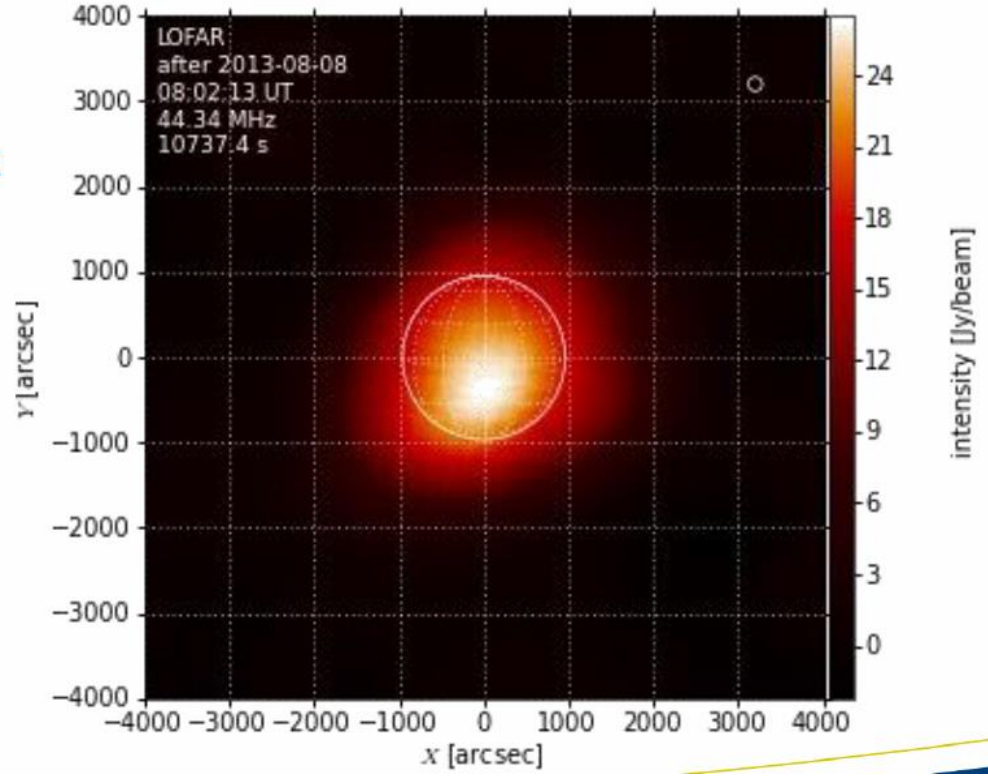
AIP

Solar corona

Solar KSP LOFAR

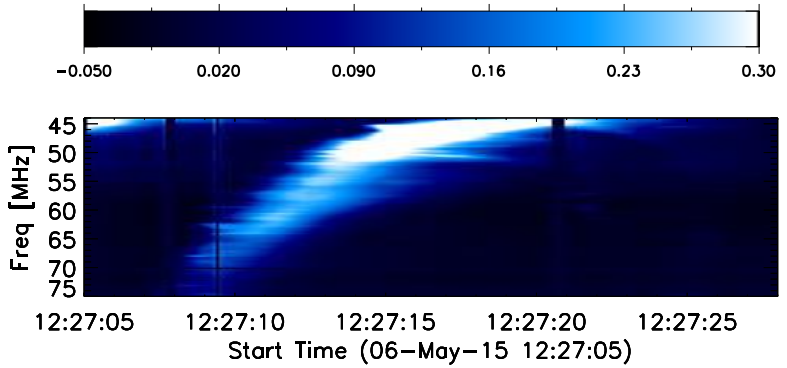
Image:

- 44 MHz
- 3 h



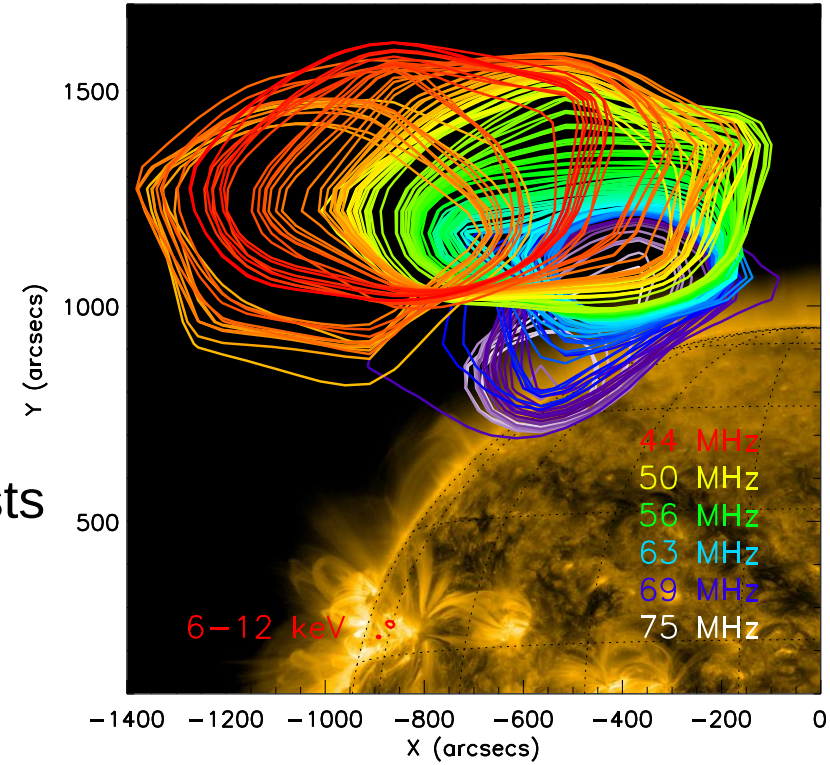
LOFAR science

D. Morrison et al, 2014
Type III bursts



LOFAR observations of U/J bursts

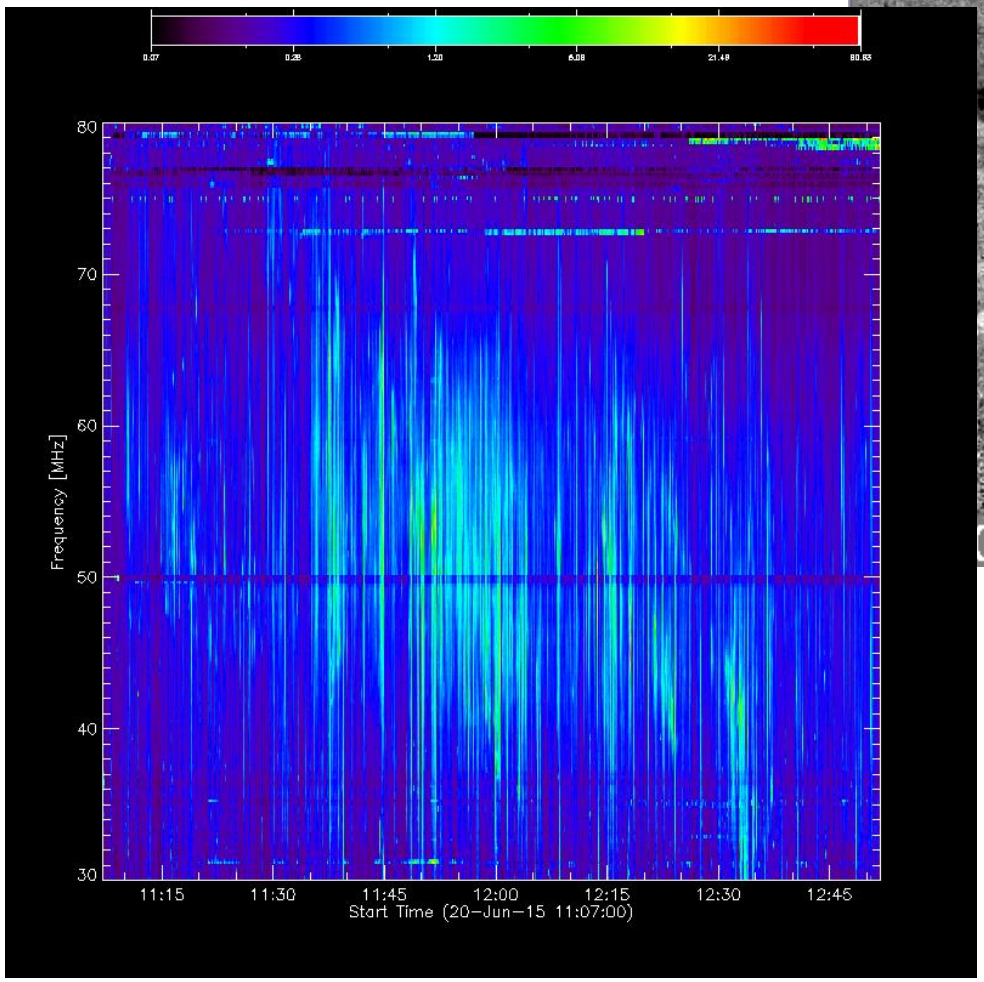
H. Reid and E Kontar,

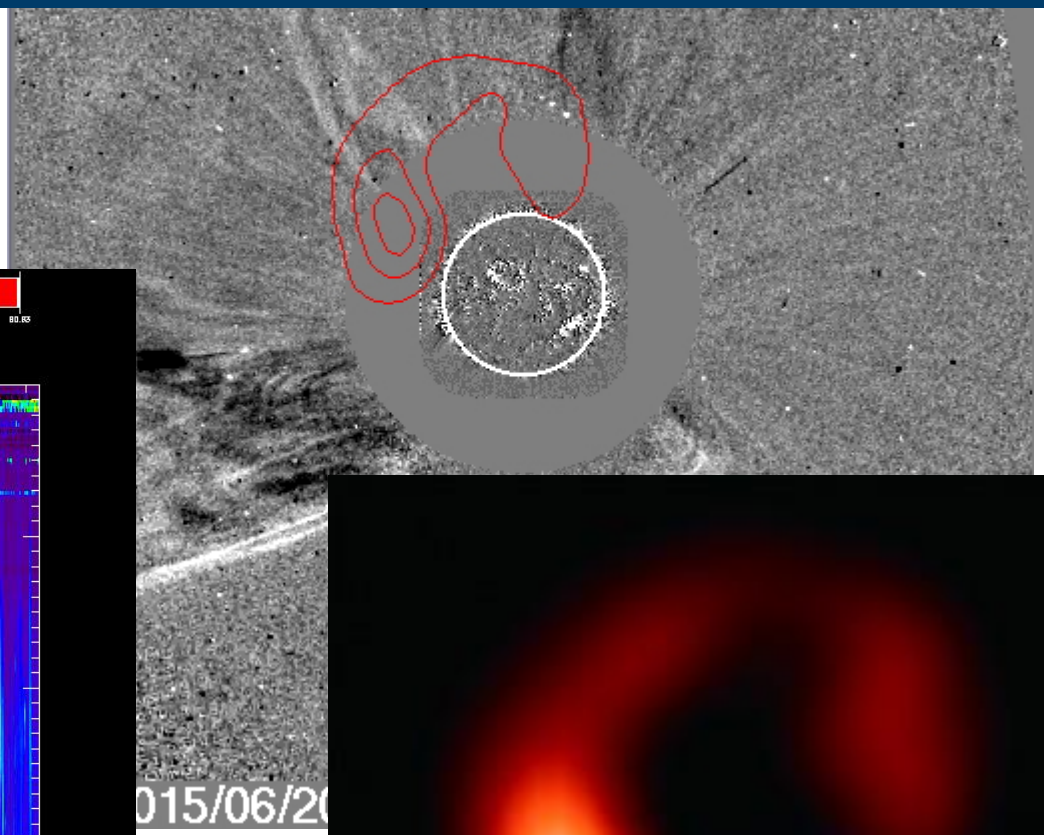


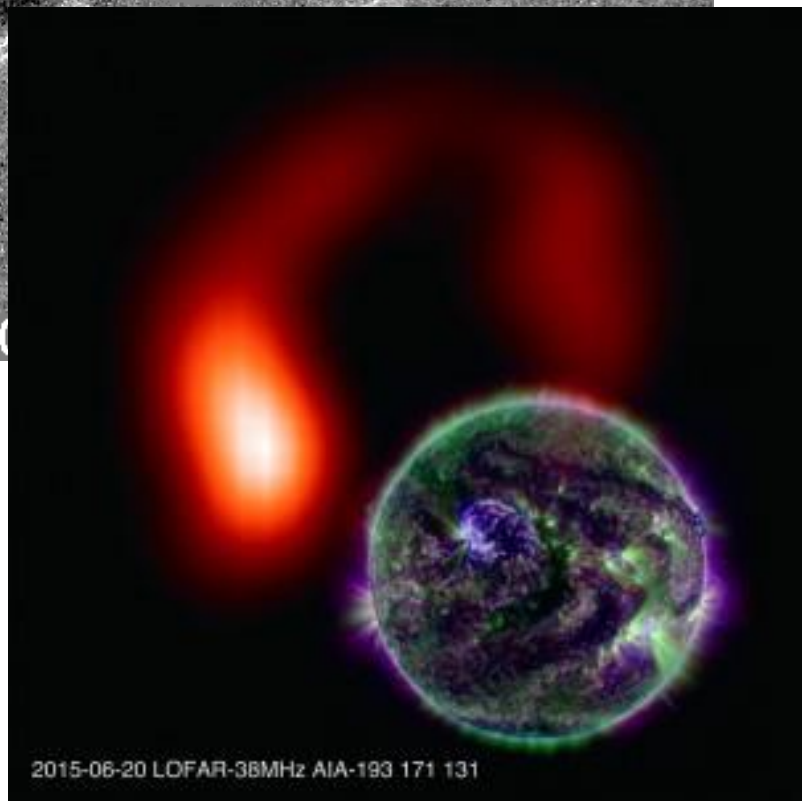
LOFAR science

A. Kuznetsov, et al

Type IV and CMEs

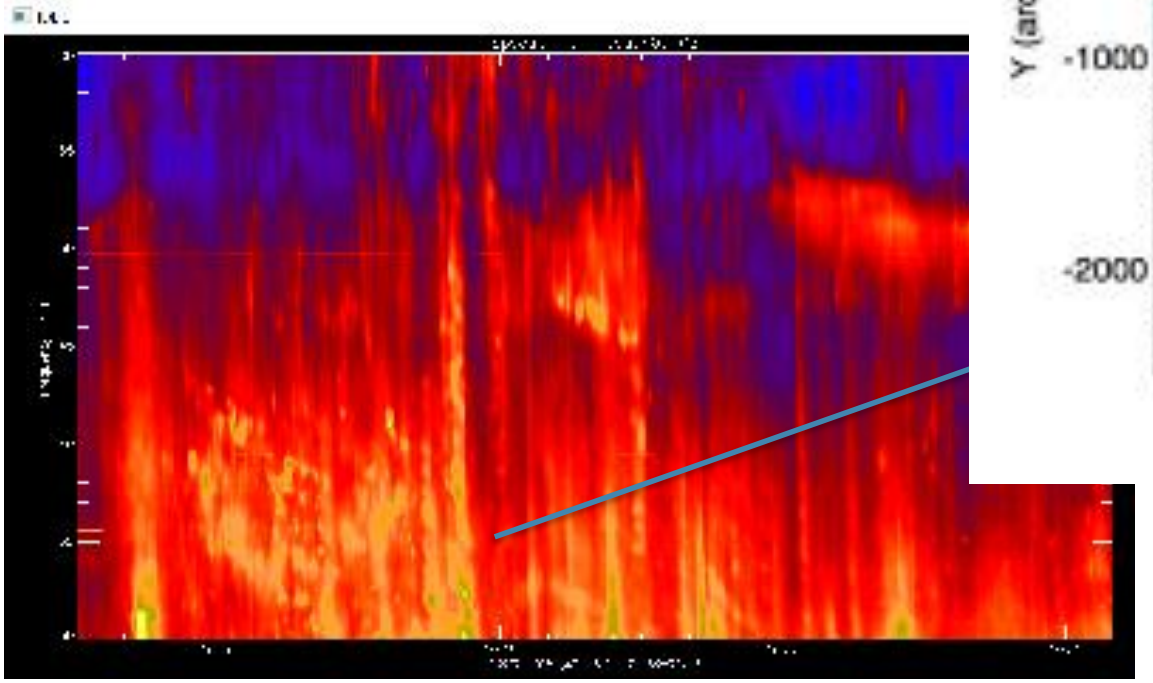


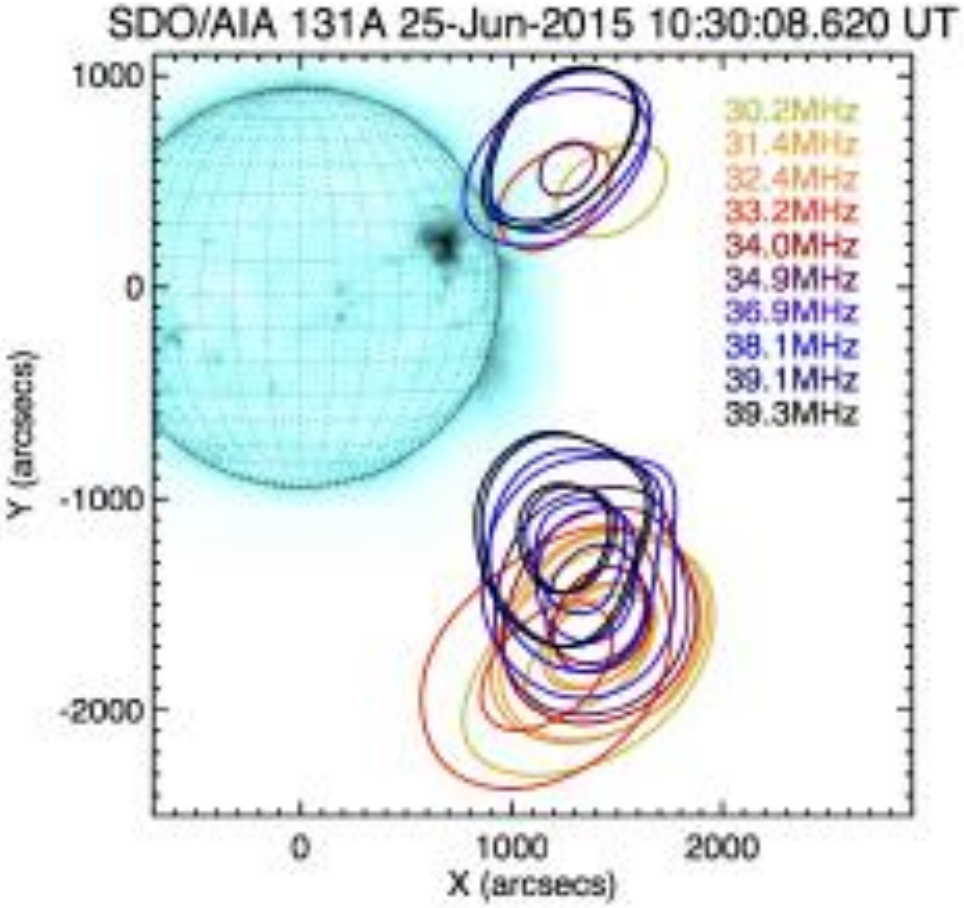




L. Glesener, et al

CMEs, jets, type II and type IIIs…





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Summary

- We had successful observations (Type III, (U, J), I, II, IV, V and fine structures…)
- Still requires software development.
- You can apply for LOFAR time (next call in Sept 2016)